GAO

U.S. GENERAL ACCOUNTING OFFICE

Report To The Secretary Of Defense

Logistics Managers Need To Consider Operational Readiness In Setting Safety Level Stocks

Maintaining a safety level of stock on hand is a form of insurance against unexpected demands or delays in delivery. However, the methods used for determining safety levels do not consider whether the items are essential to carry out a military mission.

Inventory management activities increase their effectiveness by ensuring that, within budgetary constraints, sufficient safety levels of low-cost, high-demand items are available to meet demands. However, these items are not necessarily those needed to maintain a high level of readiness.

GAO believes that operational readiness should be the prime objective of logistics managers, as well as those responsible for maintaining a ready force, and makes a number of recommendations aimed at making this objective the guiding factor in the requirements determination process.

PLRD-81-52
AUGUST 10, 1981

Request for copies of GAO reports should be sent to:

U.S. General Accounting Office
Document Handling and Information
Services Facility
P.O. Box 6015
Gaithersburg, Md. 20760

Telephone (202) 275-6241

The first five copies of individual reports are free of charge. Additional copies of bound audit reports are $3.25 each. Additional copies of unbound report (i.e., letter reports) and most other publications are $1.00 each. There will be a 25% discount on all orders for 100 or more copies mailed to a single address. Sales orders must be prepaid on a cash, check, or money order basis. Check should be made out to the "Superintendent of Documents".

UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

B-203384

The Honorable Caspar W. Weinberger
The Secretary of Defense

Dear Mr. Secretary:

This report discusses the services' management of safety level stocks and recommends alternatives to reduce dependency on such stocks. The key to achieving this objective rests with the services' ability to identify those items essential to mission accomplishment. At present, this ability is quite limited and will require increased attention if item essentiality is to play a role in inventory management in the future.

This review is an important aspect of our continuing efforts to improve inventory management among the services at the wholesale level. We have discussed the report with Defense officials and have incorporated their comments where appropriate.

This report contains recommendations to you on pages 20, 24, and 29. As you know, section 236 of the Legislative Reorganization Act of 1970 requires the head of a Federal agency to submit a written statement on actions taken on our recommendations to the House Committee on Government Operations and the Senate Committee on Governmental Affairs not later than 60 days after the date of the report and to the House and Senate Committees on Appropriations with the agency's first request for appropriations made more than 60 days after the date of the report.

We are sending copies of this report to the Director, Office of Management and Budget; the Chairmen, House Committee on Government Operations, Senate Committee on Governmental Affairs, and House and Senate Committees on Appropriations; and the Secretaries of the Army, Navy, and Air Force.

Sincerely yours,

Donald J. Horan

Donald J. Horan
Director

GENERAL ACCOUNTING OFFICE
REPORT TO THE SECRETARY
OF DEFENSE

LOGISTICS MANAGERS NEED TO CONSIDER OPERATIONAL READINESS IN SETTING SAFETY LEVEL STOCKS

D I G E S T

The services maintain large dollar amounts of onhand stock as a safety level against stockouts, which are caused by unanticipated surges in demand or delays in delivery of ordered items. Although this added level of stock enables inventory management activities to increase requisition fill rates--the percentage of requisitions filled from stock on hand--safety level stock does not materially increase the operational readiness of user activities. (See p. 9.)

In prior reports, GAO addressed the need for a management tool which recognized the relationship of an item's essentiality to mission accomplishments in making logistics decisions. This report emphasizes the role that item essentiality can play in determining safety level needs. (See p. 7.)

GAO believes that the services could reduce their dependency on safety levels if they better identified those items essential to mission accomplishment. However, the services' rate of progress in developing a mission-essentiality system indicates that it could be several years before such a system is fully implemented.

A Department of Defense task force recently studied the matter of safety levels, along with other aspects of the services' stockage policies. Its study touched on some of the problem areas identified in GAO's review, and its recommendation that the services include leadtime variation in the safety level formula should solve one problem GAO identified. However, this report addresses other issues related to the services' dependency on safety levels. (See p. 25.)

ITEM ESSENTIALITY AS A MEANS FOR DETERMINING SAFETY LEVELS

Since safety levels serve as insurance against unknown events, every effort should be made to

limit such protection to those items essential to mission accomplishment. (See p. 5.)

When determining safety levels, the services do not consider item essentiality in terms of necessity for mission accomplishment. Consequently, the services cannot ensure the items that should be afforded a greater degree of protection are, in fact, protected or that funds invested in safety level stock represent the most prudent use of such resources. For example, of the approximately 30,400 items managed by the Army's Troop Support and Aviation Materiel Readiness Command, about 3,400 items classified as nonessential have a safety level requirement of about $2.5 million. At the same time, about 10,500 items classified as essential do not have a safety level requirement. (See p. 19.)

The Air Force has made inroads in this area by establishing an essentiality coding system for identifying and defining wartime versus peacetime needs, setting priorities for repair parts program resources, and determining war reserve materiel requirements. Once the system is fully implemented, the Air Force plans to use it to determine safety levels. (See p. 17.)

The other services, primarily the Navy, have expressed doubts about the technical capability and feasibility of using such a system to determine which items should have safety levels. (See p. 19.)

GAO believes that the system developed by the Air Force, if extended to safety level requirements determination, would be a valuable management tool for identifying the essential items and for allocating limited amounts of funds.

SAFETY LEVELS MAY NOT INCREASE OPERATIONAL READINESS

The objectives of those who manage the inventory may not be compatible with the objectives of those who are responsible for maintaining an operationally ready force. (See p. 14.)

The effectiveness of inventory management activities is based on fill rates, and the effectiveness of users is based on readiness rates. Inventory management activities enhance their

effectiveness by ensuring that, within the constraints of available funds, sufficient safety levels of low-cost, high-demand items are available to meet demands. (See p. 14.)

GAO found, however, that these are not necessarily the types of items that are the major causes of degraded readiness. As a result, inventory management activities often achieve a high degree of effectiveness at the expense of readiness. (See p. 14.)

GAO believes that operational readiness should be the prime objective of logistics managers, as well as those responsible for maintaining a ready force, and that this objective should be the guiding factor in the requirements determination process.

AN ALTERNATIVE TO SAFETY LEVELS

More intensive management of stocked items could reduce the services' safety level requirements. The services use intensive management as a "stop-gap measure" when operating stocks are depleted or when funding constraints prevent them from buying safety level stocks. However, the services should consider this alternative during the front-end planning process when determining whether safety levels are needed. (See p. 21.)

SERVICE PHILOSOPHIES DIFFER ON HOW SAFETY LEVELS SHOULD BE DETERMINED

While the services have the same safety level objectives--to reduce stockouts caused by demand and leadtime variation and to optimize fill rates--they have different philosophies on how to achieve these objectives. Generally, the services concentrate safety levels on low-cost, high-demand items; however, not all the services consider leadtime variation in determining safety levels. In addition, the services differ on whether demand frequency or item cost should be the governing factor for determining which items should have safety levels. (See p. 26.)

The services cite management prerogative and different mission requirements and equipment as the principal reasons for placing safety levels on certain items and not others. Although GAO recognizes that the services have different mission requirements and support different types of equipment, it is difficult to imagine how the different philosophies can all succeed in achieving common objectives. (See p. 26.)

The Navy states that leadtime variation should be a factor in determining safety levels since leadtime variation is one of the purposes for having a safety level. This position is well supported by Army and Defense studies. However, at the time of GAO's review, the Navy was the only service which considered the factor. (See p. 26.)

GAO also found that, within the Navy, one activity considered unit cost and another activity considered demand frequency as the governing factors for determining which items should have safety levels. These differences are due largely to the lack of Defense policy guidance as to what specific item characteristics should govern the safety level determination. As a result, the services have exercised management prerogative as to how to best determine safety levels. (See pp. 27 and 28.)

GAO believes that, only when a greater degree of commonality among the services has been achieved for determining which items should have safety levels and what factors should be used to compute the safety levels, will those responsible for allocating funds to the services have assurance that such funds are being prudently applied and maximum benefits are being obtained. (See p. 29.)

RECOMMENDATIONS

The Secretary of Defense should:

--Issue to the service Secretaries policy guidance which (1) emphasizes the importance of operational readiness as a basis for stockage decisions and (2) directs that the need for safety levels be related to essential items which will increase readiness and not just fill rates. (See p. 20.)

--Direct the Secretaries of the Army and Navy to develop an item essentiality coding system which ranks the weapon systems in order of importance to mission accomplishment and relates essentiality of each support item to the system. The essentiality rankings should then be used to identify those items requiring safety levels and to compute safety level amounts. (See p. 20.)

--Direct the service Secretaries to emphasize intensive management of essential items as an alternative to safety levels. (See p. 24.)

--Issue to the services policy guidance which identifies the extent that item cost, demand frequency, and fill rate objectives should be considered in determining the safety level amount for essential items. (See p. 29.)

GAO discussed a draft of this report with Office of the Secretary of Defense (Manpower, Reserve Affairs and Logistics) officials. They generally agreed with the recommendations but were concerned with the presentation of the material. They believed that:

--Greater emphasis needed to be placed on the importance of mission essentiality, not only in its role for determining safety levels, but also its role in determining stock levels, allocating funds, and identifying war reserve items.

--The services should place increased emphasis on developing and applying a mission essentiality coding system.

--The draft report overemphasized the lack of a relationship between wholesale stock level fill rates and readiness conditions at the user level.

GAO considered the above concerns in preparing the final report and addressed these concerns in the appropriate chapters.

Contents

ABBREVIATIONS

ASO	Aviation Supply Office
DOD	Department of Defense
GAO	General Accounting Office
NORS	not operationally ready supply
OSD	Office of the Secretary of Defense
SPCC	Ships Parts Control Center
TSARCOM	Troop Support and Aviation Materiel Readiness Command

CHAPTER 1

INTRODUCTION

Having the right type and quantity of stock on hand at the right location is the key to effective and efficient logistics management. However, determining the type and quantity of stock that should be maintained is not easy. Therefore, the services have developed a sophisticated and complex process which aids in this determination. The process, known as the requirements determination process, attempts to identify future requirements on the basis of historical data and expected program changes.

Overall, requirements fall into two categories--war reserve requirements and peacetime operating requirements. The war reserve requirements are subdivided into prepositioned and other war reserve requirements. The peacetime operating requirements are comprised of administrative leadtime, production leadtime, repair cycle leadtime (for reparable items), and safety levels. The safety level, as the name implies, is a form of insurance against unanticipated surges in demand or delays in deliveries for demand-based items. In theory, if an item's demand pattern and leadtime were stable, there would be no need for a safety level. However, predicting what the future demands for an item will be and when the ordered items will arrive is an inexact science, and variations in demand and leadtime are fairly common.

Providing this added protection is expensive. At the four activities reviewed, we found that the safety level requirements and investments have increased over the past few years. Between March 1978 and March 1980, the activities' safety level requirements increased from $1.2 billion to $1.5 billion, and the amount of safety level stocks on hand increased from $1.1 billion to $1.4 billion. Appendix I shows more detailed information on safety level requirements and onhand stock for the four activities as of March 31, 1978, 1979, and 1980.

As shown on the following page, the vast majority of items managed by the four activities have safety level requirements, but as explained in later chapters of this report, the activities, due to funding constraints, have not bought all the assets to fill the requirements.

Activity	No. of items managed	No. of items with a safety level	Percent of items with a safety level
Navy:			
Aviation Supply Office	a/247,001	a/222,559	90.1
Ships Parts Control Center	383,494	103,919	27.1
Army:			
Troop Support and Aviation Materiel Readiness Command	30,404	18,694	61.5
Air Force:			
Warner Robins Air Logistics Center	160,002	(b)	-

a/Does not include reparable items because the activity does not compute safety level requirements for these items due to funding constraints.

b/Total number of items with a safety level was not readily available.

To compute safety levels, the services use a complex mathematical formula which considers such variables as item cost, demand variation, leadtime, and acceptable risk of stockout. 1/ Generally, the services concentrate safety levels on low-cost, high-demand items. By concentrating safety levels on items with these characteristics, the services can procure more fast-moving items with a limited amount of funds and thus achieve a higher service level 2/ (fill rate) than if the funds were used to purchase additional high-cost items.

Obviously, the decision to concentrate safety levels on low-cost, high-demand items is a conscious management decision based on many factors. In chapter 2, we discuss these factors and other factors that should be considered to ensure that the limited

---

1/Stock depletion caused by unanticipated surges in demand or delays in delivery of ordered items.

2/A target or goal based on the percent of requisitions filled from onhand stock.

amounts of funds are most prudently applied to those areas which not only increase supply responsiveness but also increase force readiness.

OBJECTIVES, SCOPE, AND METHODOLOGY

Our objectives were to determine whether the extent of the service activities' investment in safety level stocks is a prudent investment and whether other alternatives exist that could serve the same purpose as a safety level.

We made our review at (1) the Air Force Logistics Command in Dayton, Ohio, which is responsible for determining requirements for all items managed by the five air logistics centers, (2) Warner Robins Air Logistics Center in Warner Robins, Georgia--an inventory management activity primarily for Air Force avionics items, (3) the Army's Troop Support and Aviation Materiel Readiness Command (TSARCOM) in St. Louis, Missouri--an inventory management activity for helicopters, fixed-wing aircraft, and troop support items, and (4) the Navy's Aviation Supply Office (ASO) in Philadelphia, Pennsylvania, and Ships Parts Control Center (SPCC) in Mechanicsburg, Pennsylvania--inventory management activities for aircraft and ships parts, respectively. The services' inventory management activities are primarily responsible for computing item requirements, procuring the items within budgetary limitations, and performing other day-to-day inventory management functions.

Additionally, we performed work at the Departments of the Army, Air Force, and Navy in Washington, D.C. At each location, we reviewed pertinent regulations and held discussions with officials on the rationale for, and philosophies behind, safety levels and the reasons for concentrating the levels on low-cost, high-demand items. We also reviewed studies addressing the relationship between safety levels, fill rates, and force readiness, as well as studies addressing the use of an essentiality coding system to identify items which require safety levels.

In addition, we selected and analyzed a statistical sample consisting of 150 line items managed by each of the inventory management activities (except at SPCC where we selected 160 sample items) to determine whether a safety level was required to prevent stockouts and whether the activities could have used other requirements levels to serve the same purpose as a safety level requirement. At ASO, we selected our sample from a universe of 1,476 consumable items in a buy position 1/ during

---

1/When an item's asset position is less than the predetermined reorder point, the computer prints out a buy recommendation.

August 1980. We restricted our sample to consumable items because ASO did not compute a safety level requirement for reparable items due to funding constraints. At Warner Robins, our sample consisted of 90 consumable and 60 reparable line items in a buy position as of June 30 and July 31, 1980. At SPCC, our sample consisted of 100 consumable and 60 reparable items in a buy position during August 1980. The universe of items in a buy position was 6,167 at Warner Robins and 5,539 at SPCC. At TSARCOM, our sample consisted of consumable and reparable items selected from the activity's Order of Merit Listing as of July 31, 1980. The listing, which contained 30,404 active items ranked in descending order, was based on the frequency of demand during the last 24 months.

At each location, we compared the asset position of the sample items either on a continuous basis or at selected points in time during the previous 2 years--depending on the availability of information--to determine if the items would have stocked out if safety level stocks had not been maintained or if other stock levels could have been used to meet the need of a safety level. At TSARCOM, many of the sample items were in long supply and had been in that status for some time. At the other locations, where we selected the samples from a universe of items in a buy position, the recommended buys for many of the items were not made due to funding constraints. For these reasons, we could not demonstrate that the reduction or elimination of safety level assets saved money.

However, the fact that many of the items with safety level requirements were in long supply or were not procured raised other questions about the need for, and the types of items with, safety level requirements. These issues are discussed in the following chapters.

CHAPTER 2

OVERVIEW OF ISSUES AFFECTING THE NEED FOR SAFETY LEVELS

Is investment in safety level stocks a worthwhile investment or are there better ways to accomplish the same objectives at less cost? Managers should be asking themselves these types of questions. Unfortunately, these questions are not being asked or answered at many logistics management activities.

In theory, safety level stocks serve a valid and valuable purpose; that is, they are a form of insurance against unanticipated demand surges and delayed deliveries. However, predicting what the future needs will be for an item is an inexact science, and variations in demands and leadtimes are fairly common.

Within the logistics support area, avoiding a stockout seems to be of paramount importance, and a significant amount of money is spent to prevent such occurrences. The chart on page 6 shows the relationship between safety level stocks and total operating requirements as of March 31, 1980, for each of the four activities reviewed.

If funds were unlimited, it would make little difference as to how much was invested in safety level stocks. However, with a limited amount of funds subject to a variety of competing priorities, unnecessary investment in safety level stocks is a luxury the services cannot afford. Therefore, managers continuously try to determine how to get the most for the least amount of investment. This practice has led to the variable safety level concept which allows managers to maximize the use of funds and to optimize fill rates. While this philosophy may be sound in theory, it presumes that the items are essential and that high fill rates are important, both of which are not necessarily true.

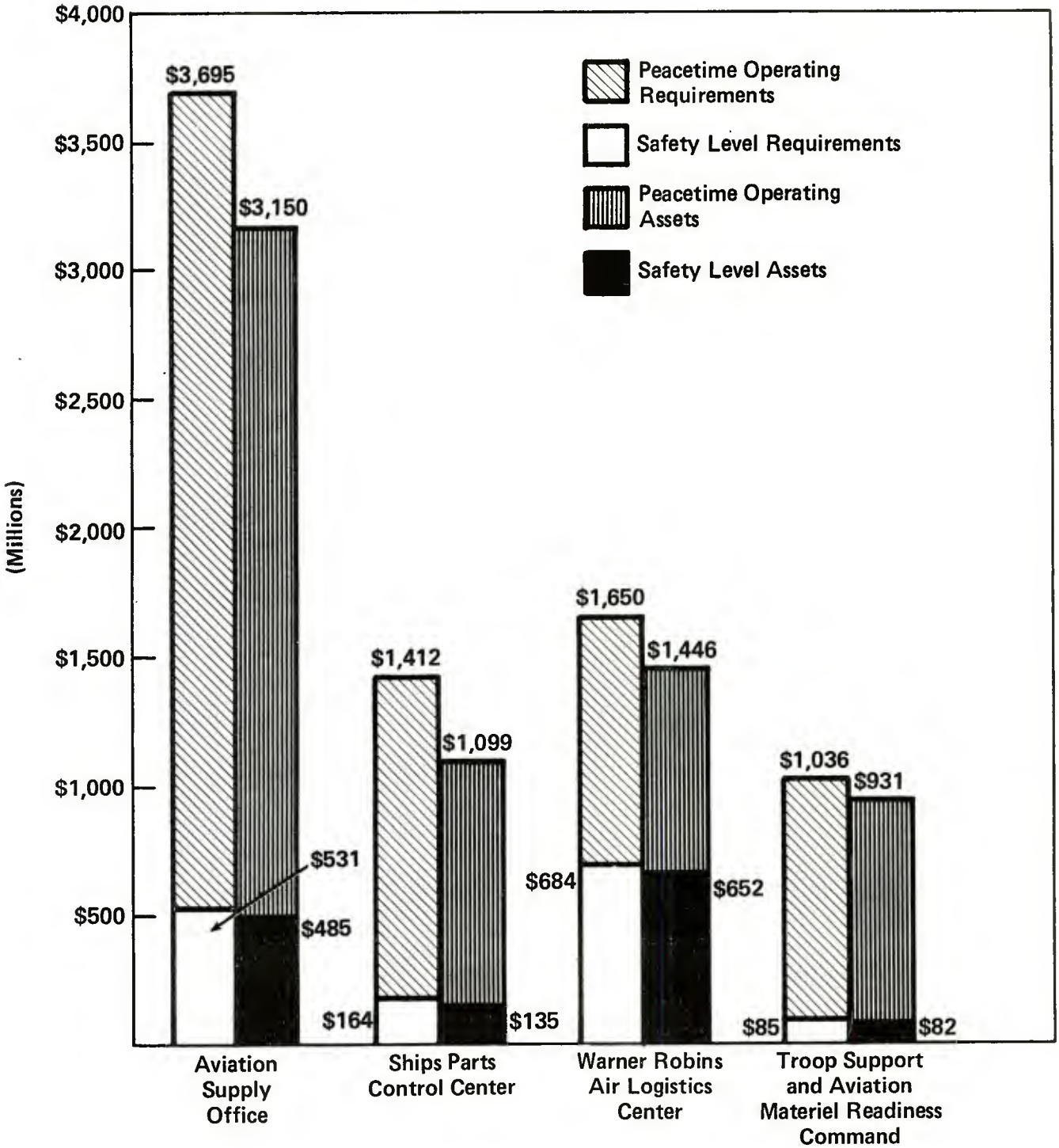
In determining the need for, and amount of, safety level stocks, managers should consider the following questions:

--Is a safety level required to ensure mission accomplishment and thereby increase readiness?

--Is the safety level investment the best use of limited funds or are there other higher priority needs which could make better use of these funds?

--What are the characteristics of items requiring safety levels?

Peacetime Operating Requirements and Assets
Compared to Safety Level Requirements and Assets
as of March 31, 1980, for the Activities Included
in GAO's Review



--Is the objective of the safety level merely to ensure that fill rate goals are achieved?

--Are there other stock levels which could be used to meet the need of a safety level?

All too frequently, managers do not adequately address these questions either separately or in concert before they decide to invest in safety level stocks. Until managers answer these questions, there is no real assurance that a safety level is required. In the following sections, we address the issues in more detail and provide an overview of the services' philosophies concerning safety levels.

ITEM ESSENTIALITY AND ITS RELATION TO SAFETY LEVELS

Item essentiality, as related to mission essentiality, should be the basis for many logistics decisions. Otherwise, there can be no assurance that funds are best applied where needed. Although the services assign an essentiality code to each item, their methods for assigning the code are different. Further, the code refers to the relationship between the item and its next higher component, rather than to the necessity for mission accomplishment. For example, item A may be essential to the operation of component B; however, component B may not be essential to its next higher component or for mission accomplishment of the end item of which component B is a part. Nevertheless, in the above example, item A would be coded essential.

In its August 31, 1980, report, "Stockage Policy Analysis," the Department of Defense (DOD) stressed the importance of the services developing a uniform essentiality coding system as part of the requirements determination process. According to the report, the services, in varying degrees, use essentiality coding to (1) select war reserve items, (2) compute safety levels (3) assign priorities for repair part schedules, (4) select items for intensive management, and (5) select items for stockage when the items do not qualify for demand-based stockage. The report also stated that the use of essentiality coding should be expanded to the secondary items requirements determination process so that more essential items receive a greater share of management attention and funding than less essential items. As a prerequisite, the services should establish the indentured relationship from item to assembly to end item. Establishing this relationship requires that

--a technique be available to identify and measure item essentiality,

--intermediate assemblies be related to an end item, and

--essentiality coding consider mission essentiality.

We fully support DOD's position that essentiality coding is needed as part of the requirements determination process.

We previously reported 1/ on the role that essentiality coding could play in logistics management and on the vast potential the coding has as a management tool for identifying priority requirements and allocating scarce resources. However, except for the Air Force, the services have not been receptive to using essentiality coding as a management tool for determining operating requirements.

The Air Force has devised an essentiality coding system which (1) ranks weapon systems in order of mission importance, (2) reveals how essential a subsystem is to the accomplishment of the user's mission, and (3) shows how critical a component is to the subsystem. Thus, the Air Force has covered the continuum from component to subsystem to weapon system and among weapon systems. In contrast, the Navy considers all stocked items to be equally essential, and the Army considers only the essentiality relationship between an item and its next higher component.

At present, except for the Navy's treatment of two specialized weapon systems, none of the services considers item essentiality in determining whether and to what extent an item needs a safety level. 2/ Under the present variable safety level concept, the emphasis is on attaining a mix of stocked items which will reduce stockouts and increase fill rates. While this intent is commendable, it does not necessarily ensure that the mission essential items receive due consideration. As noted during our review, principally in the Army, many items which were considered essential did not have safety level requirements, while at the same time, items not considered essential had safety level requirements. The reason for this paradox is a function of item cost and demand. An item with a high unit cost will have a smaller safety level than an item with a low unit cost. Also, an item with a low-demand frequency will have a smaller safety level than an item with a high-demand frequency.

The services need to link the need for safety levels to mission item essentiality. To do this, the services will first have to develop a uniform essentiality coding system and determine the relative essentiality of each item to the mission essentiality of the end item. This could take several years as evidenced by

---

1/"Essentiality of Air Force War Reserve Items" (LCD-78-421, July 25, 1978). "Army's Requirements for War Reserve Materiel Can Be Reduced Without Impairing Combat Effectiveness" (LCD-78-422A, Dec. 14, 1978).

2/Eventually, the Air Force plans to expand the use of its essentiality coding system to include identifying items that need safety levels.

the fact that the Air Force has been working on its system since the mid-1970s and only recently has completed the coding for its reparable items. Nevertheless, the matter is of such importance and has such vast potential, not only for safety levels, that it deserves the services' special emphasis. This subject is discussed in greater detail in chapter 3.

WHAT DO SAFETY LEVELS CONTRIBUTE TO INCREASED READINESS?

The main reason for the existence of a logistics support system is to promptly meet the needs of those dependent upon support. How well and how quickly the system responds to these needs are indications of the system's effectiveness. The answer as to whether effective support is being provided depends on who is doing the measuring. The objective of the provider is to fill as many requisitions as possible from onhand stock, whereas the objective of the user is to maintain as many end items as possible in an operationally ready status. These two objectives are not necessarily compatible and may be counterproductive.

Support providers can use such indicators as total fill rates, high priority fill rates, backorders, and age of backorders to monitor and measure effectiveness. The prime indicator that the services use is fill rate. DOD has established an 85-percent fill rate goal, which supposedly is the optimum level that logistics providers strive to meet. In fact, this goal serves as the basis for the providers' budget requests, and if they meet or surpass the 85-percent fill rate goal, they are considered to be highly effective. On the other hand, the effectiveness of those receiving logistics support is measured by their readiness rate, which indicates the users' ability to accomplish the assigned mission.

The main objectives of the variable safety level concept are to increase the fill rate and to reduce the incidence of stockouts. With this in mind, one might assume that if the provider is achieving its fill rate goal, then those being supported must also be achieving an effective readiness rate. This would be a faulty assumption because it presumes a direct relationship between inventory investment, fill rates, and readiness.

We previously reported 1/ that increased investment in repair parts may not offer the greatest opportunity for increased readiness. Therefore, increasing the inventory of stocked items and, hence, the safety levels, does not necessarily increase readiness. Further, DOD's study on stockage policies showed that the types of items which frequently cause aircraft and ships to be less than fully mission capable are non-demand-based

---

1/"An Analysis of Air Force Rates of Aircraft Not Operationally Ready Due to Supply" (B-179264, Mar. 29, 1974).

items. 1/ For example, during the past 2 years, 32 percent of the Navy's stock numbers causing "not mission capable due to supply" or "partially mission capable due to supply" and 98 percent of its stock numbers causing "casualty reports from ships" were managed as non-demand-based items. These types of items would not have safety levels.

During our review, however, we found that many demand-based items also caused not operationally ready supply conditions. It is for these types of items that the need exists to establish a relationship between stock levels (to include a safety level) and increased readiness. In establishing this relationship, managers should ask the following questions before investing in safety level stocks.

--Do safety levels contribute to increased readiness?

--Are there alternative investment strategies which would better increase readiness?

These matters are discussed in greater detail in chapter 3.

WHAT ARE THE CHARACTERISTICS OF ITEMS REQUIRING SAFETY LEVELS?

Little uniformity or consensus exists among or within the services as to what are, or should be, the essential characteristics of an item requiring a safety level. This lack of consensus runs the gamut of item characteristics to include demand frequency, leadtime, and risk factor. The services state that these differences are necessary because they perform different missions and support different types of equipment and that the types of items that require safety levels are those that best serve their purpose.

Although we recognize that the services have different missions and support different types of equipment, it is difficult to imagine how all the different philosophies can succeed in achieving common objectives.

1/Items for which the demand is insufficient to qualify for stockage based on cost effectiveness. The items are stocked for other reasons, such as insurance against a possible need.

Some of the varying philosophies among the services' logistics activities include:

--One activity concentrates its safety levels on low-cost items, the preponderance of which have a low-demand frequency, while other activities concentrate their safety levels on low-cost, high-demand items.

--Some activities consider leadtime variation in the safety level computation, while other activities consider the total length of leadtime in the computation.

--Some activities set the risk factor--the risk of a stockout they are willing to accept--by weapon system, while other activities assume the same risk for all items.

Furthermore, when funding constraints are imposed, the activities react differently. For example, one activity set the risk factors so that the safety level requirement was eliminated. In another instance, an activity retained the safety level in its requirements computation but eliminated or reduced its purchases.

DOD's 1980 study on stockage policies also identified numerous inconsistencies in the services' methodology for implementing DOD Instruction 4140.39, "Procurement Cycles and Safety Levels of Supply For Secondary Items." These inconsistencies concerned the (1) use of nonrecurring demands in forecasting, (2) criteria used to select demand-based items for stockage, (3) constraints on variable safety level values, and (4) methodology used to forecast demands. All of these factors influence operating stock level requirements, which in turn, influence safety level requirements.

These divergent views and inconsistencies raise questions as to what types of items should have safety levels and what factors should be considered in determining the range and depth of this added protection. Unless these questions are answered, scarce resources may be invested in safety level stock that is not needed or not needed to the extent that is being bought. Chapter 5 addresses these issues in greater detail.

ALTERNATIVES WHICH CAN REDUCE THE NEED FOR SAFETY LEVELS

Alternatives, such as more intensive management of items and use of existing stock levels, are viable options that managers should consider before investing in safety level stocks. At present, managers employ these options but only as a last resort--for example, when operating stock levels are depleted or when funding constraints prevent them from buying the total operating requirement. We believe that these alternatives need to be a part of the front-end planning process for determining safety level needs.

Service regulations and directives state that, under certain specified conditions, war reserve materiel may be used to meet high-priority peacetime needs. Although the circumstances under which such stock may be used vary among the services, there is a general requirement that when the stock is used to meet peacetime operating needs, the services act quickly to replace the stock.

The services are reluctant to use war reserve materiel to meet peacetime operating needs for fear that the materiel will be depleted and thus not be available when needed. We share this concern; however, war reserves represent a vast reservoir of stock that should be considered as an additional source to temporarily meet operating needs. Also, to alleviate the concern that using war reserve materiel for operating purposes would result in its depletion and nonavailability if and when needed, the services could establish a floor below which the stock could not be drawn.

We previously reported 1/ that the Army could eliminate safety levels for those items which are also stocked in war reserve by using the war reserve items to temporarily meet peacetime operating requirements so long as the items could be replaced promptly.

The Army agreed and issued a directive requiring deletion of depot safety levels for items in war reserves. Later, the Army rescinded the directive because of concerns that the lack of safety levels was adversely affecting operational readiness and because war reserve stocks were being depleted. We found that the lack of safety levels did not adversely affect operational readiness and that reestablishing safety levels would have only a minimal effect on reducing war reserve shortages.

Another alternative to safety levels is more intensive management of items. This technique currently is used as a "stop-gap measure" when funds are constrained and for certain high-cost items. For example, due to reduced funding in fiscal year 1980, ASO eliminated safety level requirements for its reparable items and instead closely monitored the stock positions of the higher priced and critical items to reduce the risk of stockouts. The fact that alternative measures are available and are used when operating stock is depleted or when funding constraints prevent the services from buying safety level stock raises the question as to why the services can only act after the fact.

1/"Examination of Selected Aspects of Inventory Management in Korea" (LCD-77-214, May 9, 1977).

CONCLUSIONS

The services have no assurance that limited amounts of funds are being applied to protect the items that require protection. The services need to devise a safety level investment strategy which provides assurance that safety levels increase operational readiness and not just fill rates. To do this, the services should first identify those items which are essential to mission accomplishment. In concert with identifying mission-essential items, the services must also determine whether more intensive management and other existing stock levels could be used to fill the needs of a safety level.

Only through more aggressive management actions which consider options and alternatives to the current methods of determining safety levels will the services be able to free funds that would otherwise be consumed by safety level stocks. In the following chapters, we discuss why these alternatives are necessary.

CHAPTER 3

SAFETY LEVELS MAY NOT INCREASE OPERATIONAL READINESS

The objectives of those who manage the inventory may not be compatible with the objectives of those who are responsible for maintaining an operationally ready force. The reason: the main objectives of the safety level concept are to reduce stockouts and to optimize fill rates rather than provide added protection for those items essential to mission accomplishment. As a result, inventory management activities are achieving relatively high fill rates, while user readiness rates are decreasing.

THE OBJECTIVES OF STOCK PROVIDERS AND USERS ARE NOT COMPATIBLE

DOD has established for the services an 85-percent fill rate goal which supposedly represents the optimum inventory investment level. This goal serves as the basis for the services' secondary item budget requests. However, sufficient funds are seldom available for the services to achieve full funding and adjustments must be made as to how to best optimize the fill rate. One way the services can maximize fill rates is to stock as many low-cost, high-demand items as the budget will allow. Thus, the safety level formula is designed to be sensitive to cost and demand frequency, and an activity's ability to achieve or maximize its fill rate goal has become a measure of the activity's effectiveness. However, a different measurement tool is used to gage the effectiveness of the user activities. Their effectiveness is based on operational ready rates, and as shown by our review, the types of items which increase an activity's fill rate are not necessarily the types of items that increase readiness.

Results of using fill rates to measure effectiveness

Over the past 2 years, TSARCOM has consistently attained a fill rate of approximately 85 percent; however, at the same time, the number of not operationally ready supply (NORS) backordered requisitions increased from 1,116 in October 1978 to 2,211 on May 6, 1980. During the same period, the number of NORS backordered requisitions over 90 days old increased from 105 to 719.

We reviewed a list of 1,611 NORS backordered requisitions, consisting of 296 separate line items, as of October 9, 1980, to determine the types of items causing NORS conditions and whether the items had safety level requirements. Of the 296 items, 135, or about 46 percent, did not have safety level requirements.

In commenting on the report, Office of the Secretary of Defense (OSD) officials said that a substantial portion of the 1,100-increase in NORS backorders was for helicopter skid tubes which had been backordered for an extended period of time and that a safety level would not have prevented the NORS condition.

However, our analysis of the 1,611 NORS backordered requisitions showed that the skid tubes were not a significant contributor to the NORS situation. In fact, the total quantity backordered was only 65. Thus, the backordered skid tubes did not significantly affect the number of readiness degrading items without safety levels.

At Warner Robins, the fill rate goals are 70 percent for investment items and 85 percent for stock fund items. From March 1977 to August 1980, Warner Robins' actual fill rates exceeded the goals, except for 1 month. However, the number of hours aircraft had not been mission capable increased from 565,596 in January 1979 to 722,744 in September 1980. Officials said that a lack of funds, which prevented them from buying repair parts, including safety level stocks, contributed to the increase in not mission capable hours. Our analysis showed, however, that the lack of safety level stock was not a primary cause for aircraft being not mission capable. For the 4-month period ended November 1980, 70 percent of the items on Warner Robins' critical item list 1/ did not have depot safety levels.

We previously reported 2/ that increasing the repair part investment does not ensure an increase in readiness because various other factors--primarily maintenance--have a greater effect on readiness. We pointed out that rather than buying additional spare parts, the Air Force would attain a better return on its investment--in terms of readiness--by concentrating on solving its maintenance problems.

In our opinion, increasing readiness should be the main objective of logistics providers. However, for this to become a common objective, logistics managers must make a conscious decision to ensure that those demand-based items essential to mission accomplishment receive the added protection of a safety level.

1/Consists of items causing significant not mission capable hours during the month; for example, items required in support of engines and trainers which have accumulated 2,500 or more not mission capable hours during the month. As of November 1980, 113 items--46 separate line items--were on the list. Only 14 of the 46 line items had depot safety levels.

2/"An Analysis of Air Force Rates of Aircraft Not Operationally Ready Due to Supply" (B-179264, Mar. 29, 1974).

OSD officials agreed that fill rates are not a good indicator of readiness. The officials said that a revised DOD instruction, to be published within the next few months, will emphasize, as a measure of performance, response time--how long it takes to fill the requisition for an item which was not in stock when the requisition was received--and not just fill rates.

OSD officials commented that we overemphasized the importance of wholesale level stock to increased readiness or the lack thereof. They said that retail level stocks were the major contribution to operational readiness due to the stocks' proximity to the users. The officials agreed, however, that a more important issue was that wholesale level stocks be available for essential items to minimize the time required to fill out-of-stock situations at the retail level.

OSD officials also questioned whether the 45.6 percent of NORS backordered requisitions at TSARCOM would have been prevented if the items had had safety levels. According to OSD officials, other factors were involved, as evidenced by the fact that 54.4 percent of the NORS backorders were for items with safety levels.

Our point was to demonstrate that there was no direct relationship between fill rates at the wholesale level and readiness conditions at the user level. We agree that all the NORS conditions probably would not have been averted if certain items had had safety levels. However, we believe that if the items had safety levels, and assuming the safety level stock had been procured, the incidence of NORS would have been reduced because the wholesale level could have replenished the retail level stocks and thus reduced the stockout conditions which caused the NORS condition.

Regarding the point that 54.4 percent of the NORS backorders were for items which had safety level requirements, information was not available to show whether the safety level stocks had ever been bought to fill the requirements. However, it is doubtful that the safety level stocks were ever on hand because many of the NORS requisition quantities were small--1 or 2--and the safety level requirements were much larger. Therefore, if the safety level requirements were never satisfied, the overall effect would be the same as for those items without safety levels.

DOD POLICY GUIDANCE ON ESSENTIALITY

DOD policy guidance to the services for establishing safety levels recognizes the importance of item essentiality by including an essentiality factor in the safety level formula. However, DOD's study on stockage policies found that the services have negated the effect of this factor in determining safety levels by programing it as a constant, thereby giving equal weight to all items.

DOD officials stated that, for many years, the logistics community has recognized the need for determining item essentiality. Therefore, the services, in varying degrees, use essentiality coding to (1) establish initial stockage levels, (2) plan war reserve requirements, and (3) assign priorities to repair parts schedules. However, the context in which the services use essentiality is the relative importance of an item to the more complex assembly of which it is a part. The services have not used essentiality coding to determine safety levels.

Furthermore, except for the Air Force, the services have neither rank ordered their weapon systems in terms of criticality to military mission nor related and ranked the essentiality of individual repair parts to that weapon system. Such information is needed if the services are to consider mission needs in determining which items should have the added protection offered by safety level stock.

In commenting on the report, OSD officials said that a memorandum will be sent to the services directing that an essentiality coding system similar to that of the Air Force be implemented. The officials also stated that periodic followup action will be taken to ensure that timely progress is realized.

AIR FORCE EFFORTS TO RELATE ITEM ESSENTIALITY TO REQUIREMENTS

The Air Force has developed and partially implemented a mission item essentiality coding system. The system, which identifies those items that require increased support to better enable the Air Force to perform its primary missions, consists of the following three digits:

--First digit - Represents the weapon system ranking.

--Second digit - Reveals how essential a subsystem is to the accomplishment of the user's mission.

--Third digit - Represents how critical the individual component is to the subsystem.

With this coding system, the Air Force believes that it will be better able to (1) allocate funds to peacetime and wartime requirements, (2) ensure that more essential items are scheduled for repair before the less essential items, (3) define war reserve requirements by deleting peacetime and training item requirements, and (4) ensure that safety levels on those wartime essential items are sufficient.

The Air Force has assigned essentiality codes to its reparable items and is using the coding system to a limited extent to

identify candidates which may need war reserve requirements. The Air Force plans to use the coding system for determining safety level requirements some time between 1981 and 1982.

We agree with the concept of mission item essentiality coding, but as pointed out in an ongoing GAO review, the Air Force has some serious problems to overcome before the concept can be fully and successfully implemented.

ARMY DOES NOT LINK ITEM ESSENTIALITY TO REQUIREMENTS

The Army does not differentiate between mission essential and nonmission essential items to determine safety levels. For safety level computation purposes, the Army assigns an essentiality weighting value of 1 to all items which, in essence, negates any essentiality consideration and treats all items as equally essential.

While the Army does assign each inventory item an essentiality code, it uses the code only for determining whether the item qualifies for initial stockage or as a war reserve candidate. However, even then, the Army uses item essentiality only in the context of whether the item is required to ensure the successful operation of the next higher component, not whether the component or subsystem is essential to the operation of the system or whether the system is essential to mission accomplishment. In other words, there is no link between an individual item and the mission essentiality of the end item.

Officials at the Army Inventory Research Office, which developed the Army's safety level formula, told us that one of the most common complaints expressed by users of the formula is that it does not consider item essentiality in determining what the safety level should be. Therefore, the Office has been tasked with developing a coding system which ranks the relative importance of items in terms of mission essentiality and with determining how the factor should be used in the safety level formula. However, the Office could not provide a time frame for when the system would be developed.

To obtain an idea of how the failure to consider item essentiality affects the safety level computation, we analyzed 150 sample items at TSARCOM. We did not attempt to determine the relative essentiality of each item. Rather, we used the essentiality code assigned by TSARCOM for determining initial stockage levels and war reserve requirements. Our analysis showed that of the 73 sample items with safety level requirements, 16 were considered not essential to combat or to combat support missions.

The value of the safety level requirements of the 16 items totaled about $12,500. When projected to the universe of the 30,404 items managed by TSARCOM, we estimate that the activity has 3,400 items, with an investment of about $2.5 million of safety level stock for nonessential items.

For the remaining 77 sample items without safety level requirements, 52, or about 67.5 percent, were coded as essential to combat or combat support mission. When projected to the universe of TSARCOM-managed items, we estimate that 10,540 essential items are not afforded the added protection of a safety level. Appendix II shows the above-mentioned estimates which were made at a 95-percent confidence level.

OSD officials commented that the cost of providing minimal safety levels for these items might be prohibitive. In our view, however, any additional cost would be minimized by redirecting the safety level investment on nonessential items to those essential items that currently do not have safety levels.

NAVY DOES NOT LINK INDIVIDUAL ITEM ESSENTIALITY TO WEAPON SYSTEM ESSENTIALITY

Within the Navy, the role of item essentiality in the safety level determination process varies according to activity. But, regardless of the variations, the Navy has not related the essentiality of individual items to the mission necessity of the associated weapon system.

For safety level computation purposes, the Navy varies the essentiality factor among its weapon systems on the basis of available safety level funds and the system's fill rate objective. However, the Navy uses the same essentiality factor for all items associated with the particular weapon system.

According to ASO, all items used in support of a particular weapon system are equally essential. Thus, ASO has programed the essentiality factor in the safety level formula as a constant. SPCC, like ASO, also programs the essentiality factor as a constant, thereby negating any difference in item essentiality.

ASO officials advised us that they do not have the technical capability to determine the mission essentiality of items or weapon systems. SPCC officials concluded that it is not feasible to determine the relative essentiality for most items because some items are common to more than one system. Furthermore, they stated that, except for nuclear reactor and submarine items, the Navy has reached no agreement as to which items are more mission essential than others. Until such a determination is made, ASO officials said, there would be no basis for relating item essentiality to safety levels.

CONCLUSIONS

The effectiveness of inventory management activities is based on fill rates, and the effectiveness of users is based on readiness rates. This leads to noncompatible objectives because the inventory management activities can best increase their effectiveness by ensuring that, within the constraints of available funds, sufficient stocks of low-cost, high-demand items are available to meet demands. However, these are not necessarily the types of items that are the major causes of degraded readiness. Thus, the objectives of the activities providing the items are often achieved at the expense of operational readiness.

In our opinion, mission essentiality should be a prime factor in determining whether an item should have a safety level. The essentiality coding system, when fully developed and successfully implemented by the Air Force, could be a valuable management tool in making key logistics decisions to include identifying and assuring that essential items, which increase readiness, receive the proper degree of protection.

However, on the basis of the services' current rate of progress, we believe that the development and application of an essentiality coding system could be years away. Meanwhile, the services cannot assure that those items critical to mission accomplishment are being adequately protected and that limited funds are being applied in the most prudent manner.

RECOMMENDATIONS

We recommend that the Secretary of Defense issue to the service Secretaries policy guidance which (1) emphasizes the importance of operational readiness as a basis for stockage decisions and (2) directs that the need for safety levels be related to those demand-based essential items which will increase readiness and not just fill rates.

We also recommend that the Secretary direct the Secretaries of the Army and Navy to develop an item essentiality coding system which ranks the weapon systems in order of importance to mission accomplishment and relates the essentiality of each support item to the system. The essentiality rankings should then be used to identify those items requiring safety levels and to compute safety level amounts.

CHAPTER 4

AN ALTERNATIVE TO REDUCE THE NEED FOR SAFETY LEVELS

The services have not taken full advantage of opportunities to reduce or, in some cases, to eliminate the need for safety level stock by using an alternative measure, such as intensive item management. Consequently, the services may not have always used limited amounts of funds in the most prudent manner.

The services use intensive management as a "stop-gap measure" when operating stocks are depleted or when funding constraints limit their ability to buy safety level stocks. However, the services should consider this alternative during the front-end planning process when determining whether safety levels are needed.

INTENSIVE ITEM MANAGEMENT AS AN ALTERNATIVE TO SAFETY LEVELS

ASO and Warner Robins officials said that the funding levels in relation to requirements during fiscal years 1979 through 1981 for reparable items have been so low that ASO does not compute a safety level requirement for these items and Warner Robins has essentially quit buying safety level stocks for reparable items.

The table below shows the funding requirements and funding levels for fiscal years 1977 through 1981. We did not determine the validity of the reported requirements; therefore, we cannot state an opinion on the magnitude of the funding shortfall.

Funding Requirements and Levels (note a)

Fiscal year		Warner Robins	ASO
		(millions)	
1977	Requirement	$149.6	$ -
	Funding	149.6	-
1978	Requirement	167.7	503.3
	Funding	120.6	429.1
1979	Requirement	220.6	405.0
	Funding	155.5	359.8
1980	Requirement	360.1	634.6
	Funding	158.2	399.6
1981	Requirement	474.2	949.2
	Funding	264.3	773.6

a/Funding requirements and levels for Warner Robins do not include war reserves, whereas war reserves are included in the ASO figures.

To compensate for the funding shortfalls and to improve fill rates, the activities have intensified their management of certain selected items, particularly those with high unit cost and long leadtimes. While intensive management may not totally solve the problems caused by funding shortfalls, it will lessen the impact on supply responsiveness.

More specifically, intensive management means that the item managers closely monitor the stock positions of the items so that actions, such as redistributing stock from one location to another, expediting repair actions, scheduling additional unserviceable units for repair, and expediting due-ins from contractors, can be taken to prevent a stockout. Other intensified management actions include increasing the economic order quantity and closely watching all computer-generated buy recommendations to determine if the recommended buy quantity is needed or if a lesser amount would suffice. These actions have contributed to the activities being able to maintain consistent fill rates for reparable items. For example, at Warner Robins in fiscal year 1977, when the activity was fully funded, the fill rate ranged from 65 to 74 percent. In contrast, during fiscal year 1980 when the activity's funding level was about 44 percent, the fill rate ranged from 60 to 76 percent. At ASO, the fill rate averaged between 68 to 70 percent from fiscal year 1978 to March 1980, when the activity experienced significant funding shortfalls.

Officials at the two activities stated that the effect on fill rates caused by not buying safety levels will not be evident for about 2 years. Until that time, the activities will be receiving items bought before the decision not to buy safety levels. ASO officials estimate that as a result of not buying safety levels for reparable items, the fill rate will decrease to 60 percent in 2 years. However, the officials also pointed out that even with full funding, ASO probably would not be able to achieve DOD's 85-percent fill rate goal because factors other than funding have a direct impact on fill rates.

The other two activities in our review--SPCC and TSARCOM--have not experienced funding shortfalls of the same magnitude as ASO and Warner Robins and do buy safety level stocks for reparable items. At TSARCOM, the fill rates have remained near the DOD goal, while at SPCC, the fill rates not only do not approach the DOD goal but have decreased during the last 3 fiscal years, as shown on the following page.

Activity	Fill rates FY 1978	FY 1979	FY 1980
	----------(percent)----------		
SPCC	65.9	62.7	59.3
TSARCOM	82.4	83.4	a/84.3

a/As of March 1980.

The fact that ASO and Warner Robins have been able to maintain fairly consistent fill rates without safety levels, while SPCC, which does buy safety level stocks, has experienced a decrease in its fill rate over a period of time, shows that having a safety level does not ensure high fill rates. It also shows that intensive management can reduce the need for safety levels.

OSD officials agreed that intensive management would be an acceptable alternative to investment in safety levels. However, they were concerned that applying more intensive management would require a sizable increase in the number of highly skilled item managers. Furthermore, determining which items to intensively manage requires the ability to identify essential items, a capability that the services do not currently possess.

We agree that identifying the items to intensively manage should be driven by essentiality considerations and that all items would not be a candidate for intensive management. However, until the services determine the number of essential items that are candidates for intensive management, there is no basis for assuming that more item managers would be needed. As discussed previously, intensive management is already used for certain types of items, and ASO and Warner Robins used the technique when funding constraints prevented them from buying safety levels. Using intensive management as an alternative to safety levels should not be limited to those instances where funding prevents buying safety levels. Rather, it should be a normal part of the front-end planning process for determining requirements levels.

CONCLUSIONS

The services could reduce their investment in safety level stock by using more intensive management techniques. Before applying these techniques, however, the services should first identify those items which require safety levels. After doing this, the services should then consider intensive management before investing limited funds in an additional layer of stock. The services will then be assured that the safety level investment represents the best use of resources.

RECOMMENDATION

We recommend that the Secretary of Defense direct the service Secretaries to emphasize intensive management of essential items as an alternative to safety levels.

CHAPTER 5

ADDITIONAL DOD POLICY GUIDANCE NEEDED TO BETTER DEFINE ITEM CHARACTERISTICS AND FACTORS FOR DETERMINING SAFETY LEVELS

The services have the same safety level objectives--to reduce stockouts caused by demand surges and leadtime variation 1/ and to optimize fill rates. To achieve these objectives, the services generally concentrate safety levels on low-cost, high-demand items. However, not all the services consider leadtime variation in determining safety levels. In addition, the services differ on whether demand frequency or item cost should be the governing factor for determining which items should have safety levels.

DOD GUIDANCE FOR ESTABLISHING SAFETY LEVELS

DOD policy guidance for establishing safety levels, as set forth in DOD Instruction 4140.39, "Procurement Cycles and Safety Levels of Supply For Secondary Items," allows the services considerable latitude in implementing the policy.

According to DOD's 1980 study on stockage policies, the latitude provided by the instruction has resulted in wide implementation variances among the services on such factors as the (1) replacement costs used in the safety level model, (2) computation of obsolescent rates, (3) basis for demand-based stockage, (4) budget formulation and execution goals, (5) use of nonrecurring demands in forecasting, (6) leadtime variance, (7) demand variance, and (8) demand forecasting techniques. The study concluded that, as a result of these inconsistencies, the services have often procured unnecessary quantities of stock which later became excess to the services' needs.

We did not address all of the above inconsistencies because many of them are included in an ongoing GAO review on the validity of requirements in the services or are being studied by DOD as part of its long-term continuing effort. However, we did address the areas of inconsistent use of leadtime variances in the safety level formulas and the application of safety levels to high-demand versus low-demand type items.

OSD officials commented that the soon-to-be-issued DOD Instruction 4140.39 would stress the importance of item essentiality for determining safety levels. However, no additional guidance would be provided. We agree that item essentiality is the key;

1/The amount of time by which the production leadtime for a particular order varies from previous production orders for the same item.

however, as discussed in the following sections, once essentiality has been determined, additional central guidance will be needed to ensure that the amount of safety level stock is based on a common approach.

SERVICE PHILOSOPHIES FOR DETERMINING SAFETY LEVELS

The services cite management prerogative and different mission requirements and equipment as the principal reasons for placing safety levels on certain items and not others. As a result, the services differ on how best to achieve the safety level objective of reduced stockouts and optimum fill rates. Although we recognize that the services have different mission requirements and support different types of equipment, it is difficult to imagine how the different philosophies can all succeed in achieving common objectives.

Although the services consider numerous item characteristics, such as (1) demand variability, (2) unit cost, (3) average requisition size, (4) holding cost, and (5) demand probability, the factor which has the most effect on the amount of the safety level is unit cost. As a result, items with a low unit cost tend to have larger safety levels than items with a high unit cost. While this aids the services in optimizing their fill rates, it does not necessarily increase the readiness posture of the users of the items. Additionally, we noted that, except for the Navy, the other two services do not consider leadtime variation as a factor in determining safety levels. Further, there are subtle differences within the Navy as to whether demand frequency should be an item characteristic for determining which items should have safety level requirements.

Leadtime variation should be a factor in determining the need for, and amount of, safety levels

Protecting items from stockouts caused by variation in leadtime due to delivery delays of ordered items was one of the main reasons the services developed the safety level concept. However, the Army and Air Force do not consider leadtime variation in determining which items should have safety levels and in what amounts.

ASO states, and rightfully so, that since the purpose of a safety level is to reduce the risk of a stockout due to variations in demand and leadtime, there is no rationale for using total leadtime in the safety level computation. In addition, according to ASO, if there is no variance in these elements, a safety level is not needed.

Air Force officials at Warner Robins stated that the current safety level computation for the reparable and stock fund systems used only the most current item leadtime and that the

systems did not have the capability to recognize variableness in leadtime. The officials further stated that, in their opinion, applying a variable leadtime factor would not reduce procurements because other factors, such as demand variability and program changes, also affect procurements. Furthermore, since leadtimes are increasing, the number of items with consistent leadtimes would be insignificant.

TSARCOM officials suggested that we contact the Army's Inventory Research Office regarding whether the safety level formula should include a leadtime variability factor, since that office was responsible for developing the Army's safety level formula. Inventory Research Office officials stated that leadtime variation should be considered in determining safety levels and that, on the basis of a study, 1/ they found that the use of leadtime variation in the safety level formula would enable the Army to attain the desired fill rate objective and reduce inventory investment. The Office has recommended that a leadtime variance factor be used in the safety level computation; however, at the time of our review, the Army had not implemented the recommendation.

In its 1980 study on stockage policies, DOD also supported the use of leadtime variation in the safety level computation. The study concluded that since DOD Instruction 4140.39 and other DOD policy issuances did not address the computation of leadtime demand variance, most of the services have not specifically accounted for the variability of leadtime in their formulas. Accordingly, the study recommended that leadtime variance be factored into the safety level computation.

OSD officials informed us that revised DOD Instruction 4140.39 would include leadtime demand variance as a factor to be used in determining safety levels.

Demand frequency or item cost--which should govern whether an item has a safety level?

The Army and Air Force generally concentrate safety levels on the high-demand, low-cost items. By doing so, the services can buy more items with a limited amount of resources, and since the items have a high-demand frequency, the fill rates are optimized. However, within the Navy, safety levels are driven by demand frequency, or item cost, or a combination of the two, depending on the service activity.

At ASO, item cost is the driving force for determining which items have safety levels. As shown below, about 94 percent of the low-priced items have safety levels, compared to about 63

1/"Measurement and Implications of Production Lead Time Variability" (Sept., 1979).

percent of the high-priced items, regardless of demand frequency. Compounding the issue, however, is the fact that about 98 percent of the low-demand items, regaraless of price, have safety levels.

Item characteristic (note a)	No. of items	No. of items with a safety level	Percent
Low price:			
Medium demand	20,435	19,212	94.0
High demand	6,472	6,191	95.7
High price:			
Medium demand	29,880	18,658	62.4
High demand	23,849	15,202	63.7
Low demand	166,365	163,296	98.2

a/The tabular figures are only for stock fund items. ASO does not compute safety levels for reparable items due to funding constraints.

In contrast to ASO, SPCC computes safety levels for reparable and stock-funded items on the basis of demand, with all items except those having less than one demand a quarter, receiving some safety level.

Demand frequency (note a)	No. of items	No. of items with a safety level	Percent
5 or more	4,892	4,892	100.0
3 to 4	3,764	3,764	100.0
1 to 2	18,120	18,120	100.0
less than 1	279,575	0	0.0
Total	306,351	26,776	8.7

a/Based on quarterly demand frequency for selected types of items (shipboard consumables, shipboard reparables, and electronic reparables).

The differences in philosophy between ASO and SPCC and the other services are due, in part, to the latitude allowed by DOD in implementing its safety level policy guidance. Another factor is the prerogative of management to determine what items should have safety levels based on what it believes to be appropriate, considering the types of items, funding levels, and fill rate objectives. Therefore, although the computational methodology is the same, the safety level philosophy may differ at each activity based on what management is trying to achieve.

CONCLUSIONS

Although the services are trying to achieve common objectives with safety levels--reduce stockouts and optimize fill rates--they have different philosophies for achieving these objectives, particularly relating to leadtime variability and item cost and demand.

These differences have occurred because the current DOD policy guidance does not address the above-mentioned aspects and, in the absence of such guidance, the services have exercised management prerogatives for determining how best to achieve their objectives.

In previous chapters, we identified essentiality to mission accomplishment as the prime criterion for determining which items should have safety levels and alternative ways to reduce dependency on safety levels. We believe that once the mission essential items have been identified and the alternative ways to reduce safety levels have been explored, the safety level amount should be based on common item characteristics. Only when the services reach a common determination of what item characteristics should be used to compute the safety level amount, will those responsible for allocating limited funds have assurance that such funds are being prudently applied and maximum benefits are being obtained. DOD's action to include leadtime variance as one of the factors in the safety level formula is a step in the right direction. However, additional guidance is needed as to what role cost, demand frequency, and fill rates play in determining the amount of safety level.

RECOMMENDATION

We recommend that the Secretary of Defense issue to the services policy guidance which identifies the extent that item cost, demand frequency, and fill rate objectives should be considered in determining the safety level amount for essential items.

PEACETIME OPERATING REQUIREMENTS AND ASSETS COMPARED TO SAFETY LEVEL REQUIREMENTS AND ASSETS FOR ACTIVITIES IN GAO'S REVIEW

Activity	Year (note b)	Peacetime operating (note a) requirements	Peacetime operating (note a) assets	Safety level requirements	Safety level assets
		(000 omitted)			
ASO	1978	$2,830,188	$2,440,165	$437,263	$400,025
	1979	3,496,997	2,879,615	483,298	452,905
	1980	3,695,224	3,149,143	530,818	485,423
SPCC	1978	804,951	674,758	79,667	72,215
	1979	965,273	798,690	102,812	92,188
	1980	1,413,229	1,099,831	164,646	132,335
TSARCOM	1978	1,018,184	891,604	81,674	81,073
	1979	924,339	845,897	76,216	75,095
	1980	1,036,141	930,649	85,677	82,844
Warner Robins	1978	1,241,167	1,117,724	538,142	520,363
	1979	1,512,129	1,364,044	638,534	616,235
	1980	1,649,228	1,446,721	683,566	652,472

a/Includes requirements and assets for production and administrative leadtime, repair cycle, numerical stock objective, safety level, and stock due-out.

b/As of March 31.

APPENDIX II

CATEGORIES OF ESTIMATES AND ASSOCIATED 95-PERCENT CONFIDENCE LEVEL INTERVALS AT THE ACTIVITIES INCLUDED IN GAO'S REVIEW

Category	Estimate	Range	
		Low	High
Number of TSARCOM-managed items which are classified nonessential but have safety level requirements	3,423	1,741	4,745
Dollar value of safety level requirement of TSARCOM-managed items classified nonessential	$2,544,985	$506,828	$4,583,142
Number of TSARCOM items which are classified essential but do not have safety level requirements	10,540	8,224	12,856

(947423)